

REMARKS

The Examiner rejected claims 1-12 under 35 U.S.C. §103(a) as being unpatentable over Amako in view of Shiobara because the Examiner believes that Figure 1 of Amako shows a semiconductor wafer, which inherently possesses an active surface, bonding pads, and a cured silicone covering a portion of the active surface, and the silicone member comprising an organopolysiloxane containing an average of at least two silicon-bonded alkenyl groups per molecule, an organohydrogensiloxane containing an average of at least two silicon-bonded hydrogen atoms per molecule, an inorganic filler, and a hydrosilylation catalyst, and heating the silicone deposit to form the cured silicone member. The Examiner concludes that Amako discloses a cured silicone member having the same composition as Applicant's disclosure, and it is obvious that the cured silicone of Amako has a coefficient of linear expansion and a modulus in a vicinity of the range recited in the pending claim.

The Examiner further argues that Amako substantially the entire claimed structure. However, the Examiner admits that Amako fails to disclose an inorganic filler with a surface area less than 25 m²/g. The Examiner further argues that Shiobara discloses a filler used in a curable resin and having a surface area less than 25 m²/g for semiconductor packaging. The Examiner concludes that it would have been obvious to one of ordinary skill in the art at the time of the invention to provide a proper particle size distribution for the cured silicone based on the disclosure of Shiobara to a semiconductor device of Amako.

Amako discloses a curable organopolysiloxane composition comprising (A) an organopolysiloxane containing an average of at least two alkenyl groups and at least two silicon-bonded hydrogen atoms per molecule, (B) a compound containing alkenyl and hydroxyphenyl groups in each molecule, and (C) a hydrosilylation catalyst (paragraph [0008]). The composition may contain reinforcing fillers for the purpose of improving the strength (paragraph [0038]). Amako further discloses a unified article comprising a substrate and a cured product of the organopolysiloxane composition (paragraph [0040] and Figure 1). The unified article may be an epoxy resin substrate having a silicon chip thereon and a cured product of the organopolysiloxane composition (Figure 1). The problem to be solved by Amako is to provide a curable organopolysiloxane composition wherein the silicone component that out-migrates by effusion

from the composition is highly curable and adherent to a variety of substrates and the organopolysiloxane composition has excellent adhesion to a wide variety of substrates (paragraphs [004] and [0006]).

Shiobara discloses a method for fabricating semiconductor devices of the flip-chip design (col. 1, lines 4-5). The problem to be solved by Shiobara is to provide a method, which ensures the space between a substrate and a semiconductor chip is filled with a resin encapsulant without generating voids and without damaging solder bumps, and which ensures encapsulation is completed within a short time (col. 1, lines 29-37). Shiobara does not disclose any silicone compositions.

This invention relates to a semiconductor package comprising:

a semiconductor wafer having an active surface comprising at least one integrated circuit, wherein each integrated circuit has a plurality of bond pads; and

at least one cured silicone member covering at least a portion of the active surface, wherein at least a portion of each bond pad is not covered by the silicone member, the silicone member has a coefficient of linear thermal expansion of from 60 to 280 $\mu\text{m}/\text{m}^\circ\text{C}$ between -40 and 150 $^\circ\text{C}$ and a modulus of from 1 to 300 MPa at 25 $^\circ\text{C}$, and the silicone member is prepared by a method comprising the steps of:

(i) printing a silicone composition on the active surface to form a silicone deposit, wherein the silicone composition comprises:

(A) an organopolysiloxane containing an average of at least two silicon-bonded alkenyl groups per molecule,

(B) an organohydrogensiloxane containing an average of at least two silicon-bonded hydrogen atoms per molecule in a concentration sufficient to cure the composition,

(C) an effective amount of an inorganic filler having a surface area less than 25 m^2/g , and

(D) a catalytic amount of a hydrosilylation catalyst; and

(ii) heating the silicone deposit for an amount of time sufficient to form the cured silicone member.

To establish a *prima facie* case of obviousness, three basic criteria must be met. First, there must be some suggestion or motivation, either in the references themselves or in the knowledge generally available to one of ordinary skill in the art, to modify the reference or to combine reference teachings. Second, there must be a reasonable expectation of success. Finally, the prior art references must teach or suggest all the claim limitations. The teaching or suggestion to make the claimed combination and the reasonable expectation of success must both be found in the prior art, and not based on the applicant's disclosure MPEP §2142.

Even if one skilled in the art combined the disclosures of Amako and Shiobara, by adding a filler having a particle size disclosed by Shiobara to the curable organopolysiloxane composition of Amako, this would not meet the third criterion for a *prima facie* case of obviousness because not all of the claim limitations would be taught or suggested. The composition of Amako lacks component (A) used in the composition in the semiconductor package of claim 1. Component A of Amako has both alkenyl and silicon-bonded hydrogen atoms in the same molecule. Component (A) of this invention has alkenyl groups and other organic groups bonded to silicon atoms (paragraph [0029]). Component (A) of this invention does not contain silicon-bonded hydrogen atoms, as required for component A of Amako. Adding the a filler with a particle size disclosed by Shiobara to the composition of Amako does not cure this defect. Shiobara does not disclose any components corresponding to component (A) required by this invention. Adding a filler of Shiobara to the curable organopolysiloxane composition of Amako does not teach or suggest component (A) of this invention.

This invention is not obvious over Amako in view of Shiobara because Amako fails to teach or suggest component (A) of this invention and Shiobara fails to cure this defect. A *prima facie* case of obviousness has not been established under MPEP §2143 because Amako and Shiobara fail to teach or suggest all of the claim limitations of this invention. The Applicants request that the Examiner withdraw rejection of claims 1-12 under 35 U.S.C. §103(a) and allow the claims to issue.

The Examiner rejected claim 13 under 35 U.S.C. §103(a) as being unpatentable over Amako in view of Shiobara as applied to claim 1 above and further in view of Fjelstad because the Examiner believes Amako and Shiobara show a silicon wafer with a structure substantially

identical to the present invention except for connection of a metal trace. The Examiner further argues that Fjelstad shows a semiconductor package comprising a semiconductor wafer having an active surface comprising at least one integrated circuit, wherein each integrated circuit has a plurality of bond pads, a cured silicone layer with a thickness range of 74-200 micrometers covering a portion of the active surface of the wafer except the bond pads, and a metal trace having a proximal end attached to each bond pad and a distal end lying on the surface of the cured silicone layer. The Examiner concludes that it would have been obvious to have a connection of the metal trace to a bond pad and a cured silicone layer because such a configuration alleviates stresses created between the substrate and the chip.

Claim 13 is not obvious for the same reasons discussed above for claims 1-12. The disclosure of a metal trace by Fjelstad does not cure the defects of Amako in view of Shiobara (lack of component (A)) discussed above. Therefore, the present invention is not obvious over Amako in view of Shiobara and further in view of Fjelstad because this combination of references does not teach or suggest all of the limitations of claim 13. A *prima facie* case of obviousness has not been established, therefore, the Applicants request that the Examiner withdraw rejection of claim 13 under 35 U.S.C. §103(a) and allow all claims to issue.

The Examiner rejected claims 14-19 and 23-32 under 35 U.S.C. §103(a) over Fjelstad in view of Amako and Shiobara. The Examiner argues that it would have been obvious at the time the invention was made to utilize the disclosures of Amako and Shiobara for the compliant layer of Fjelstad to have the cured silicone layer with a specific composition as recited in the pending claim. The Examiner admits that Fjelstad fails to teach a specific silicone composition. The Examiner relies on Amako in view of Shiobara as discussed above for the specific silicone composition.

As discussed above for claims 1-13, the combination of Amako and Shiobara fails to teach or suggest all of the claim limitations because component (A) of this invention is missing from this combination. Fjelstad fails to teach or suggest a specific silicone composition, therefore, Fjelstad also fails to teach or suggest component (A) of this invention. The combination of Fjelstad in view of Amako and Shiobara fails to teach or suggest all of the claim limitations, therefore, a *prima facie* case of obviousness has not been established under MPEP

§2143. The Applicants request that the Examiner withdraw rejection of claims 14-19 and 23-32 under 35 U.S.C. §103(a) and allow the claims to issue.

The Applicants have particularly pointed out and distinctly claimed the subject matter that they regard as their invention, and the instant invention is novel and unobvious. Reconsideration of the application is requested.

The present reply is being submitted within the three month period for response to the outstanding office action. Although the Applicants believe in good faith that no extensions of time are needed, the Applicants hereby petition for any necessary extensions of time. You are authorized to charge deposit account 04-1520 for any fees necessary to maintain the pendency of this application. You are authorized to make any additional copies of this sheet needed to accomplish the purposes provided for herein and to charge any fee for such copies to deposit account 04-1520.

Respectfully Submitted,
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